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United States Patent [19]

Scheifler et al.

[11] **Patent Number:** 6,138,238

[45] **Date of Patent:** Oct. 24, 2000

[54] **STACK-BASED ACCESS CONTROL USING CODE AND EXECUTOR IDENTIFIERS**

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[73] Assignee: **Sun Microsystems, Inc.**, Palo Alto, Calif.

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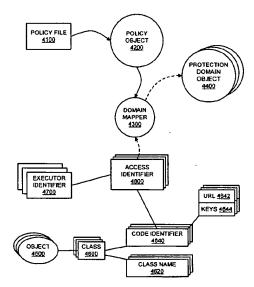
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[57] **ABSTRACT**

A system regulates access to resources requested by an operation executing on a computer. The operation invokes a plurality of methods that operate upon code during execution. The system includes a policy file, a call stack, and an execution unit. The policy file stores permissions for each of the resources. The permissions authorize particular types of access to the resource based on a source of the code and an executor of the code. The call stack stores representations of the methods and executors in an order of invocation by the operation. The execution unit grants access to the resource when the types of access authorized by the permissions of all of the methods and executors on the call stack encompass the access requested by the operation.

13 Claims, 7 Drawing Sheets

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STACK-BASED ACCESS CONTROL USING CODE AND EXECUTOR IDENTIFIERS

RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application entitled "Controlling Access to a Resource," bearing attorney docket no. 3070-007/P2244/TJC, filed on Dec. 11, 1997, and accorded Ser. No. 08/988,431, Provisional U.S. Patent application Ser. No. 60/076,048, entitled "Distributed Computing System," filed on Feb. 26, 1998. which is hereby incorporated by reference.

The following identified U.S. patent applications are relied upon and are incorporated by reference in this application.

U.S. patent application entitled "Protection Domains to Provide Security in a Computer System," filed on Dec. 11, 1997, and accorded Ser. No. 08/988,439.

U.S. patent application entitled "Secure Class Resolution, Loading and Definition," filed on Dec. 1, 1997, and accorded Ser. No. 08/990,660.

U.S. patent application entitled "Typed, Parameterized, and Extensible Access Control Permissions," filed on Dec. 11, 1997, and accorded Ser. No. 08/988,857.

U.S. patent application entitled "Layer-Independent Security for Communication Channels," filed on Jun. 26, 1997, and accorded Ser. No. 08/883,636.

U.S. patent application Ser. No. 09/044,923, entitled "Method and System for Leasing Storage,"bearing attorney docket no. 06502.0011-01000, and filed on the same date herewith.

U.S. patent application Ser. No. 08/044,838, entitled "Method, Apparatus, and Product for Leasing of Delegation Certificates in a Distributed System," bearing attorney docket no. 06502.0011-02000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044834, entitled "Method, Apparatus and Product for Leasing of Group Membership in a Distributed System," bearing attorney docket no. 0011-03000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,916, entitled "Leasing for Failure Detection," bearing attorney docket no. 06502.0011-04000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,933, entitled "Method for Transporting Behavior in Event Based System," bearing attorney docket no. 06502.0054-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,919, entitled "Deferred Reconstruction of Objects and Remote Loading for Event Notification in a Distributed System," bearing attorney docket no. 06502.0062-01000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,938, entitled "Methods and Apparatus for Remote Method Invocation," bearing attorney docket no. 06502.0102-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/045,652, entitled "Method and System for Deterministic Hashes to Identify Remote Methods," bearing attorney docket no. 06502.0103-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,790, entitled "Method and Apparatus for Determining Status of Remote Objects in a Distributed System," bearing attorney docket no. 06502.0104-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,930, entitled "Downloadable Smart Proxies for Performing Processing

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Associated with a Remote Procedure Call in a Distributed System," bearing attorney docket no. 06502.0105-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,917, entitled "Suspension and Continuation of Remote Methods," bearing attorney docket no. 06502.0106-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,835, entitled "Method and System for Multi-Entry and Multi-Template Matching in a Database," bearing attorney docket no. 06502.0107-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,839, entitled "Method and System for In-Place Modifications in a Database," bearing attorney docket no. 06502.0108, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,945, entitled "Method and System for Typesafe Attribute Matching in a Database," bearing attorney docket no. 06502.0109-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,931, entitled "Dynamic Lookup Service in a Distributed System," bearing attorney docket no. 06502.0110-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,939, entitled "Apparatus and Method for Providing Downloadable Code for Use in Communicating with a Device in a Distributed System," bearing attorney docket no. 06502.0112-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,826, entitled "Method and System for Facilitating Access to a Lookup Service," bearing attorney docket no. 06502.0113-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,932, entitled "Apparatus and Method for Dynamically Verifying Information in a Distributed System," bearing attorney docket no. 06502.0114-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/030,840, entitled "Method and Apparatus for Dynamic Distributed Computing Over a Network," and filed on Feb. 26, 1998.

U.S. patent application Ser. No. 09/044,936, entitled "An Interactive Design Tool for Persistent Shared Memory Spaces," bearing attorney docket no. 06502.0116-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,934, entitled "Polymorphic Token-Based Control," bearing attorney docket no. 06502.0117-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,934, entitled "Stack-Based Security Requirements," bearing attorney docket no. 06502.0119-00000, and filed on the same date herewith.

U.S. patent application Ser. No. 09/044,837, entitled "Per-Method Designation of Security Requirements," bearing attorney docket no. 06502.0120-00000, and filed on the same date herewith.

BACKGROUND OF THE INVENTION

The present invention is directed to security measures in a computer system and, more particularly, to systems and methods that control access to a resource based on the source of the code and the identity of the principal on whose behalf the code is being executed.

As the use of computer systems grows, organizations are becoming increasingly reliant upon them. A malfunction in